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REMARKS/ARGUMENTS

Subsequent to the Office Action dated 09/11/06, claims 1-27 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Xiaolan, U.S. Publ. No. 2004/0043856, ('*Xiaolan*') in view of O'Neil et al., USPN 6,506,140 ('*O'Neil*'). By this office action, claims 1-27 remain as originally submitted.

Claim Rejection – 35 U.S.C. §103(a)

Applicants respectfully traverse the rejections of claims 1-27 as being unpatentable over *Xiaolan* in view of *O'Neil*.

Claim 1 of the present invention sets forth a multi-mode, electro-mechanical transmission including an input member coupled to a prime mover, at least one planetary gear set, at least one motor, at least one torque transfer device, a plurality of operating states and an output member, comprising: an open loop motor torque controller operative to control a preselected transmission speed to a target speed as a predetermined function of preselected transmission torques and accelerations.

Xiaolan teaches an electro-mechanical infinitely variable transmission having two planetary gear sets and two electric machines, a torque transfer device, and input and output shafts. As stated in the Office Action, *Xiaolan* fails to teach an open loop motor torque controller. The Office Action asserts that *O'Neil* discloses an open loop motor torque controller operative to control a preselected transmission speed to a target speed as a predetermined function of preselected transmission torques and accelerations, referencing Col. 7, Lines 59-64 as proof thereof.

O'Neil discloses an internal combustion engine coupled to a torque converter coupled to an electronically controlled transmission with a plurality of selectable discrete gear ratios (*See,* Col. 2, Lines 18-32). *O'Neil* is concerned with controlling engine torque (*See,* Fig. 3). During a closed throttle event (*See,* Fig. 6, items 612, 614, 616) with the torque converter locked, an open loop control approach is used to control engine torque to a small positive torque where feedback for torque converter input and output speed based upon a torque converter model are not used. (*See,* Col. 7, Lines

13-20). Alternatively, an open loop control approach is used to control engine torque to a small negative torque with the torque converter locked, required engine torque (not speed) is set to a small negative value provided in an open loop mode without feedback (*See,* Col. 7, Lines 59-64). In either event, this action occurs to minimize inadvertent transition through a zero torque line. (*See,* Col. 7, Lines 13-20, Col. 8, Lines 1-2).

Applicant respectfully traverses any rejection of claim 1 as being unpatentable over *Xiaolan* in view of *O'Neil* because it would not have been obvious to one of ordinary skill in the art to select the various elements from the cited prior art and combine them in the manner claimed, as is required under 35 U.S.C. §103(a).

First, the cited references fail to teach an open loop (electric) motor torque controller operative to control a preselected transmission speed to a target speed as a predetermined function of preselected transmission torques and accelerations. The motor is defined as an electric motor/generator (*See, e.g.,* Para. 0024), operative to supply a motor torque (*See,* Para. 0041) which is open-loop controlled by a controller to a target speed (*See,* Para. 0047).

O'Neil teaches an open loop control of engine torque for a conventional powertrain, not an open loop electric motor speed control for an electro-mechanical transmission as claimed in the instant invention. Furthermore, *O'Neil* teaches controlling engine torque based upon an estimate from powertrain operating conditions (Col. 7, Lines 21-28). There is no teaching or description related to controlling a preselected transmission speed to a target speed as a predetermined function of preselected transmission torques and accelerations, as is claimed in claim 1.

Secondly, there is no suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select the references and combine them in the way that would produce the claimed invention, as required under 35 U.S.C. § 103(a). (*See,* Karsten Mfg. Corp. v. Cleveland Gulf Co., 242 F.3d 1376, 1385, 58 USPQ2d 1286, 1293 (Fed. Cir. 2001). *O'Neil* teaches controlling an open loop control of engine torque related to locking a torque converter clutch device on a

conventional powertrain system. *Xiaolan* teaches an electro-mechanical transmission device to reduce internal power circulation and provide smooth, non-interruptive shifting in speed, power, torque between regime and mode changes.

Nowhere does either *O'Neil* or *Xiaolan* teach or suggest the controls of the present invention (see, e.g., independent claim 1) including an open loop motor torque controller operative to control a preselected transmission speed to a target speed as a predetermined function of preselected transmission torques and accelerations. Nowhere does either *O'Neil* or *Xiaolan* teach or suggest the method of the present invention (see e.g., independent claims 7 and 12) including providing a model of the transmission including controlled and uncontrolled external torques and preselected transmission accelerations, providing values for the uncontrolled external torques into the model, providing values for the preselected transmission accelerations into the model, solving the model for values of the controlled external torques, and applying torque to the transmission in accordance with the values for the controlled external torques.

Thus, claim 1 specifically, and all claims depending thereon, are patentably distinguishable over the cited art, and therefore allowable.

Claims 7 and 12 are patentably distinguishable for the same reasons as set forth with regard to claim 1, and therefore allowable. Claims 2, 13-17, 20-25 are all dependent - immediately or through intervening dependent claims – from one of claims 1 and 12 and add additional limitations thereto, and are therefore allowable.

The Office Action stated that claims 2, 8-9, 18-19, and 26-27 were rejected under 35 U.S.C. §103(a), because *O'Neil* disclosed at least one closed loop effort operative to act upon a transmission speed error.

Applicants respectfully traverse this rejection, because claims 2, 8-9, 18-19, and 26-27 are all dependent - immediately or through intervening dependent claims – from one of now allowable claims 1, 7, and 12, with additional limitations thereto, and are therefore allowable.

Furthermore, applicants traverse the rejection because *O'Neil* and *Xiaolan* fail to teach or describe all the elements of any of claims 2, 8-9, 18-19, and 26-27. The invention describes at Para. 0041 that it is preferred to perform input speed control via motor torques Ta and Tb and not via the input torque Ti at the input member or via the output torque To at the output member. Furthermore, in Para. 0045 there is described an example of a transmission speed error comprising an input speed profile error, which is determined based upon a difference between a desired input speed and a current input speed profile, which can be used to control transmission input speed. In contrast, *O'Neil* teaches a closed loop engine speed control where the desired engine speed is calculated to be slightly less than the torque converter output speed, and feedback is used to minimize inadvertent zero torque transitions during a closed throttle event. (*See,* Col. 7, Lines 64-67 and Col. 8, Lines 1-2).

Based upon the above, applicants respectfully assert that there is no teaching in either *O'Neil* or *Xiaolan* to perform input speed control via motor torques Ta and Tb. Thus claims 2, 8-9, 18-19, and 26-27 are distinguishable, and therefore allowable.

With reference to claims 3-6 and 10-11, the Office Action stated that *O'Neil* discloses the elements thereof, referencing Col. 5, Lines 15-35 as evidence of different operating states, and Col. 2, Lines 23-67 as evidence of different operating gears.

Applicants respectfully traverse this rejection, because claims 3-6 and 10-11 are all dependent - immediately or through intervening dependent claims – from now allowable claim 1 with additional limitations thereto, and are therefore allowable.

Furthermore, applicants traverse the rejection because *O'Neil* fails to teach or describe all the elements of any of claims 3-6 and 10-11. Specifically referring to Claim 3, dependent from claim 1, speed control for the multi-mode, electro-mechanical transmission is set forth, including *inter alia*, a plurality of operating states. The operating states include wherein when one of a first and a second state is operative, preselected transmission member torques comprise input member torque and output member torque, and said preselected transmission accelerations comprise input member acceleration and output member acceleration. The invention describes

(at Para. 0041) that it is preferred to perform input speed control via motor torques Ta and Tb and not via the input torque Ti at the input member or via the output torque To at the output member, wherein the input member refers to an input to the transmission and the output member refers to the output of the transmission.

Neither *O'Neil* nor *Xiaolan* teaches or describes the input member torque and output member torque, and said preselected transmission accelerations which comprise input member acceleration and output member acceleration, each which are claimed in the instant invention. The disclosure of *O'Neil* teaches torque arbitration for managing torque converter lockup, based upon an operator input to an accelerator pedal (APP). *O'Neil* is concerned with transmission input torque; there is no teaching or discussion of speed control related to an output of the transmission. The states referred to by *O'Neil* comprise control states executed when operator input to the accelerator pedal is closed, and the engine is not in a closed-loop or feedback control mode (Elements 612, 614 of Fig. 6). The states of *O'Neil* comprise open-loop operating conditions to control engine output torque under specific vehicle and engine operating conditions (Figs. 6-13), and not the first state effective to operatively couple the input to the output through a first gear set, a second state effective to operatively couple the input to the output through a second gear set, and a third state effective to operatively decouple the output from the transmission, as described in the instant invention.

Therefore, claim 3 is patentably distinguishable from the cited prior art, and thus allowable. Claims 4-6 and 10-11 are patentably distinguishable for the same reasons as set forth with regard to Claim 3, and therefore allowable.

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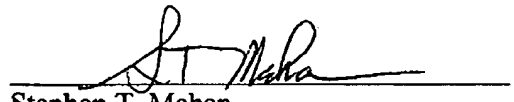
Conclusion

It is respectfully submitted that all pending claims 1-27 are in condition for allowance and requested that same be allowed to proceed to issue. If the Examiner has any questions regarding the contents of the present response, the Applicants' attorney may be contacted at the phone number appearing below.

Respectfully Submitted,



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